Studies on the Application of Electrostatic Spraying to Porcelain Enamels. (II)

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$$T_m = 527 - 18 \cdot \mathrm{Log}_{10} t \qquad (1)$$

Furthermore, it was observed that the rate of increase of the density D (g./cm.^{3}) reached to a maximum at a certain temperature Tv. The temperature Tv (°C), at which the condition $d(dD/dt)/dT = 0$ was satisfied, was found to decrease with time t (minute) according to the equation:

$$T_v = 521 - 18 \cdot \mathrm{Log}_{10} t \qquad (2)$$

Hence it may be said that the most efficient compacting method of the glass is the one with which the temperature is lowered continuously by the schedule represented by the equation (2). But it was found that the difference between the density of glass treated by the above schedule and that by the equation (1) is so small (ca, 0.0002 g./cm.^{3}) that it is almost within the error of the density measurements. The constant temperature holding, therefore, can be adopted as the practically efficient compacting method of the glass.

It is believe that, for its simplicity and accuracy this method of density determination is especially convenient for finding out the most efficient compacting schedule of glass.

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11. Studies on the Application of Electrostatic Spraying to Porcelain Enamels. (II)

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In the previous paper (this Bull. **25**, (1951), 60), the authors have confirmed that the application of the electrostatic field in the spray booth will be the most effective method for obtaining the possible uniform coating with minimum loss due to overspray. The uniformity obtained by the former experiments, has been left much to be desired, however, especially for the materials of complicated shapes such as kitchen wares. To obtain the heigher uniformity in coating, the authors have designed a new booth in which the specimens can rotate on their axis during they travel through the electrostatic field.

An overhead monorail conveyer was put up and a booth was build around it to house the electrodes within the spary zone. Two copper wire netting 40 cm in height and 150 cm long, which serve as the negative electrodes, were hung on either side of the line of the travelling pieces. The distance between the line and the netting was 25 cm. The conveyer was so designed that pieces, which were hung vertically from the conveyer, rotate on their vertical axises during travelling. The speed of travelling and the rotation were 0.25 m per min. and 1.1 rev. per min,

respectively. The two automatic spray guns were set up at the entrance of the booth on either side of the conveyer line and were so placed that the axis of the spray was directed at an acute angle of about 10° to the conveyer line. The velocity of air in the middle of the booth was regulated to be 0.8—3.0 m per sec..

The following table shows the results of an experiment, in which the small basin 20 cm in diameter and 5 cm in depth were used. The electrostatic voltage applied between the basin and the negative electrode was 36 K. V..

Uniformity of the application
(Application weight; gr. per dm^2.)

	Inside surface	Outside surface
Side wall:		
upper	1.0	1.7
middle	1.6	1.6
//	1.6	1.9
lower	2.2	1.1
Bottom wall	1.6	1.6
Total	7.2	7.2

These figures indicate that the uniformity of thickness could be improved appreciably by rotating the specimens when they pass through the electrostatic field and moreover the efficiency was almost doubled compared with the ordinary automatic spraying methods, the application of which are, at present, confined only to the panels.

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12. Study on High Dielectric Constant Ceramics. (X) $BaToiO_3$ Ceramics as the Electrostrictive Vibrator

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There are four modes of vibration in $BaTiO_3$ ceramics which can be excited by an electrostrictive effect, namely a longitudinal mode at right angles to the applied field, a radial mode of a circuler plate at right angles to the applied field, a thickness longitudinal mode and a thickness shear mode. The last one is excited when the A.C. field is at right angles to the D.C. polarization. The amount of motion is larger than in magnetostrictive materials, and $BaTiO_3$ seems to be one of the most important electromechanical transducing element.

As is well known from the theory of electro-acoustic transformation, equivalent